NDT Case Study: BroadbandCensus.com Uses the Network Diagnostic Tool as a Beta Speed Test

BroadbandCensus.com is a new Web service that provides the public with free information on local broadband availability, competition, speeds and service. By participating in an anonymous online census questionnaire, users can greatly contribute to the knowledge and understanding about the state of the nation's broadband competition and services – particularly as federal lawmakers consider issues in the development of a national broadband policy.

The Problem

A crucial component of the Broadband Census service is its beta speed test. It allows consumers all across the country to test their residential high-speed Internet connections to determine whether broadband providers are delivering the promised services.

The Solution

In order to provide this service, BroadbandCensus.com has deployed the NDT (Network Diagnostic Tool). This open-source network performance testing system is designed to identify computer configuration and network infrastructure problems that can degrade broadband performance. NDT is under active development by the Internet2 community.

When BroadbandCensus.com began developing its Web service in the fall of 2007, various alternative speed tests were explored. The company selected the NDT for two principal reasons. First, NDT is a well-designed, easy to use, open-source solution that is made freely available by Internet2, an organization with goals and purposes broadly congruent with those of BroadbandCensus.com – namely, the advancement of knowledge about the Internet. In addition, NDT has been successfully used by other broadband mapping endeavors, including the eCorridors Program at Virginia Tech. Virginia Tech is an Internet2 member that utilizes NDT to collect data of residential and small business broadband trends throughout the Commonwealth of Virginia.

The implementation process for the beta speed test began in early 2008, after BroadbandCensus.com launched the first version of its site. Through close collaboration with both Internet2 staff and Virginia Tech colleagues, deployment of the NDT speed test was seamless and enabled the release of a beta version of the speed test weeks earlier than anticipated.

The Result

Today, BroadbandCensus.com utilizes four available NDT servers: Argonne National Laboratory, the University of California at Santa Cruz, Stanford University, and Virginia Tech. BroadbandCensus.com routes the Internet user to the closest NDT server based upon the stated ZIP code of the user. The company is looking to expand the reach to eight servers in the coming months.

Additionally, BroadbandCensus.com aims to implement an automatic "failover" feature that checks whether a particular NDT server is busy with another test. In doing so, the service could automatically switch the user to the next-closest server rather than requiring them to resubmit the test. Both of these features – additional servers, and the "failover" capability – will provide the necessary scalability as traffic grows on the site, creating more demand for more speed tests.

So far, BroadbandCensus.com has assembled thousands of speed tests, census entries and comments from everyday Internet uses. All of these are freely accessible at BroadbandCensus.com under its Creative Commons Attribution-Noncommercial License. The company is now working to compile its first comprehensive assessment of the speed test data obtained through the NDT tests as part of its contract, with the Pew Internet & American Life Project, to track actual and promised broadband speeds across the country.

"We are gratified that the availability of NDT has allowed us to make a robust speed test available on short notice and with a limited budget," said Drew Clark, executive director of BroadbandCensus.com. "By shedding light on Internet speeds, we believe the service will play an important role in helping U.S. Internet users and policy makers understand the shortcomings of existing broadband services that can provide a more solid basis for making better decisions about future broadband services and policies."

NDT: Network Diagnostic Tool

NDT provides desktop troubleshooting for all users. Multi-level results allow novice and expert users to view and understand the test results, providing a snapshot of the problem to aid in the resolution.

Why Should I Use NDT?

By design, the Internet protocols isolate applications from the network infrastructure. One unintended result is that problems with infrastructure components, host configurations, and application behavior all exhibit the same symptom – less than expected performance. NDT is a user-friendly tool that can quickly identify which one of these three issues is actually having an impact on end-to-end performance.

Last Mile Issues

Several studies have shown that the majority of network performance problems occur in or near the users' desktop or laptop computer (the "last mile"). These problems include, but are not limited to: duplex mismatch conditions on Ethernet or FastEthernet links, incorrectly set TCP buffers in the user's computer, or problems with the local network infrastructure.

NDT is designed to quickly and easily identify a specific set of conditions that are known to affect network performance. A multi-level series of plain language messages (suitable for novice users) and detailed test results (suitable for network engineers) are generated and available to the user. The test results may easily be emailed to the appropriate administrator to assist in the problem resolution phase.

How Does it Work?

The system is composed of a client program (command line or Java applet) and a pair of server programs (a web server and a testing/analysis engine). Both command line and web-based clients communicate with a Web100-enhanced server to perform these diagnostic functions. Multi-level results allow novice and expert users to view and understand the test results.

The Java Applet is downloaded automatically when you access a specific NDT server. Once the download is complete, the applet is ready for testing. At the conclusion of the test, the main applet page shows the basic throughput results, both to and from the client, and a simple statement of what technology might be limiting the throughput. There are links for statistics, more details, and report problems (which can be customized to send data to campus IT support).

How do I Get Started?

First, try the tool out via one of the publicly accessible servers listed at: http://e2epi.internet2.edu/ndt/ndt-server-list.html

To learn more about NDT visit the website (http://e2epi.internet2.edu/ndt/) and join the community by attending presentations or a Network Performance Workshop offered through Internet2-sponsored events and joining the email lists:

- ndt-users: A general discussion list to discuss problems (https://mail.internet2.edu/wws/info/ndt-users). This list is monitored by the designer.
- ndt-announce: New versions, significant developments, and upcoming presentations (https://mail.internet2.edu/wws/info/ndt-announce).

Acknowledgments

This material is based on work supported by Argonne National Laboratory, Internet2, Oak Ridge National Laboratory, and, in part, by the Office of Science, U.S. Department of Energy under Contract W-31-109-ENG-38y.

200807-CS-E2E-NDT

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